



(12) **EUROPEAN PATENT APPLICATION**

(88) Date of publication A3:
20.08.2008 Bulletin 2008/34

(51) Int Cl.:
G11C 17/16 (2006.01) G11C 17/18 (2006.01)

(43) Date of publication A2:
05.03.2008 Bulletin 2008/10

(21) Application number: **07114261.6**

(22) Date of filing: **13.08.2007**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC MT NL PL PT RO SE SI SK TR
 Designated Extension States:
AL BA HR MK RS

(72) Inventor: **Yamaguchi, Shusaku**
Kawasaki-shi
Kanagawa 211-8588 (JP)

(74) Representative: **Kreutzer, Ulrich et al**
Cabinet Beau de Loménie
Bavariaring 26
80336 München (DE)

(30) Priority: **18.08.2006 JP 2006223428**

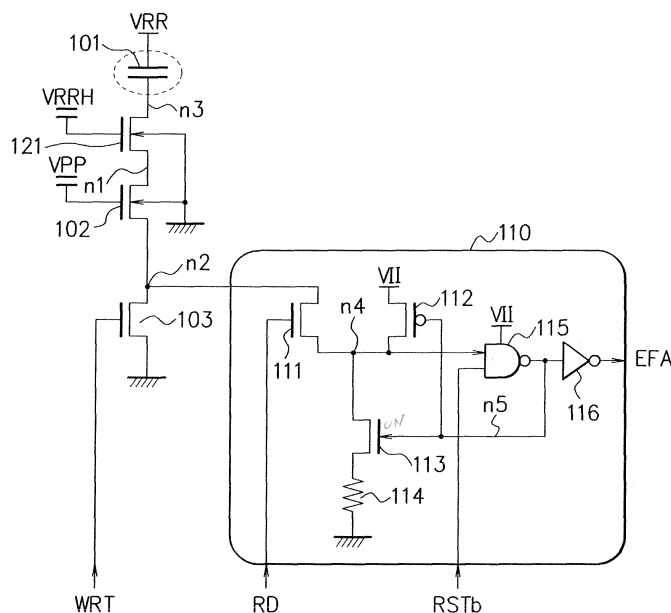
(71) Applicant: **FUJITSU LIMITED**
Kawasaki-shi, Kanagawa 211-8588 (JP)

(54) **Electric fuse circuit and electronic component**

(57) An electric fuse circuit is provided which has a capacitor (101) that forms an electric fuse; a write circuit (103) for breaking an insulating film of the capacitor (101), by applying a voltage to a terminal of the capacitor in

response to a write signal; and at least two transistors, including a first transistor (121) and a second transistor (102), which are connected in series between the capacitor (101) and the write circuit (103).

F I G. 1





DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2004/042317 A1 (MARR KENNETH W [US] ET AL) 4 March 2004 (2004-03-04)	1,2	INV. G11C17/16
Y	* paragraphs [0035], [0054], [0070]; figures 1,5B *	3-5,14, 17	G11C17/18
A	-----	6-8	
Y	US 2003/231534 A1 (TAKAMI SHINYA [JP]) 18 December 2003 (2003-12-18) * paragraph [0035]; figure 1 *	3	
Y	US 2006/092742 A1 (PAILLET FABRICE [US] ET AL) 4 May 2006 (2006-05-04) * paragraphs [0019], [0023]; figures 1-4 *	3	
Y	US 5 712 577 A (CHO HANJIN [KR]) 27 January 1998 (1998-01-27) * figures 1,3,5 *	4	
Y	US 2005/285663 A1 (NEWMAN PAUL F [US]) 29 December 2005 (2005-12-29) * paragraphs [0018], [0019]; figure 1 *	5	TECHNICAL FIELDS SEARCHED (IPC)
A	US 2005/219889 A1 (CHEN VINCENT [US] ET AL) 6 October 2005 (2005-10-06) * figure 4 *	6	G11C
A	US 2001/022746 A1 (KIM PHIL-JUNG [KR] ET AL) 20 September 2001 (2001-09-20) * figure 4A *	6	
A	US 2002/093867 A1 (MURAOKA KAZUYOSHI [JP] ET AL) 18 July 2002 (2002-07-18) * figure 1 *	7,8	
P,A	US 2006/203591 A1 (LEE DONG K [KR]) 14 September 2006 (2006-09-14) * figure 7c *	7,8	
	----- -/--		
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 10 July 2008	Examiner Ramcke, Ties
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	



DOCUMENTS CONSIDERED TO BE RELEVANT				
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)	
X	US 6 693 481 B1 (ZHENG BO [US]) 17 February 2004 (2004-02-17)	9,10		
Y	* column 6, line 18 - line 28; figure 1B * -----	18		
X	US 2006/152272 A1 (SUEOKA ATSUSHI [JP]) 13 July 2006 (2006-07-13)	9-13		
Y	* figure 14 * -----	14,18		
X	US 2003/015733 A1 (HAYASHI KOHTARO [JP] ET AL) 23 January 2003 (2003-01-23)	15,16,19		
Y	* paragraph [0004]; figure 14 * -----	17,18		
The present search report has been drawn up for all claims				TECHNICAL FIELDS SEARCHED (IPC)
Place of search		Date of completion of the search		Examiner
Munich		10 July 2008		Ramcke, Ties
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>				

2
EPO FORM 1503 03.82 (P04C01)

**CLAIMS INCURRING FEES**

The present European patent application comprised at the time of filing claims for which payment was due.

- Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):
- No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

- All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.
- Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
- None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:
- The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).



The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-3

Claim 3: the antifuse capacitor is a MOS-fet with a thinner gate oxide thickness than the first and second transistor

2. claim: 4

Connecting the back gate of the first and second transistor to a reference

3. claim: 5

Providing that the back gates of the first and second transistors are coupled to their respective source

4. claim: 6

Well structure of figure 3

5. claims: 7,8

Generating and providing the gate voltages to the first and second transistor

6. claims: 9-14

Outputting one data bit based on the resistance of two fuses

7. claims: 15-19

Packing a fuse chip and a memory chip

ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.

EP 07 11 4261

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

10-07-2008

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2004042317 A1	04-03-2004	US 2004155315 A1	12-08-2004
US 2003231534 A1	18-12-2003	JP 2004022736 A	22-01-2004
US 2006092742 A1	04-05-2006	NONE	
US 5712577 A	27-01-1998	NONE	
US 2005285663 A1	29-12-2005	US 2006244511 A1	02-11-2006
US 2005219889 A1	06-10-2005	NONE	
US 2001022746 A1	20-09-2001	JP 2001210094 A	03-08-2001
		KR 20010065138 A	11-07-2001
		TW 480706 B	21-03-2002
US 2002093867 A1	18-07-2002	DE 10200671 A1	19-09-2002
		JP 2002217295 A	02-08-2002
		KR 20020061113 A	22-07-2002
US 2006203591 A1	14-09-2006	NONE	
US 6693481 B1	17-02-2004	NONE	
US 2006152272 A1	13-07-2006	CN 1815736 A	09-08-2006
		JP 3923982 B2	06-06-2007
		JP 2006197124 A	27-07-2006
US 2003015733 A1	23-01-2003	JP 3644913 B2	11-05-2005
		JP 2003036691 A	07-02-2003